

CMSC 131: Chapter 21 (Supplement)

Multidimensional Arrays of Objects

Multidimensional Arrays of Objects

Multidimensional arrays of primitives:

```
char[ ][ ] page = new char[50][100];
```

What about **multidimensional arrays of objects**? Let's explore this.

Day: This class stores appointments for a person on a given day.

```
private ArrayList appointments
private int dayNumber
private String name
```

MonthlyCalendar: This class stores each day of the current month.

```
private String monthName
private Day[][] calendar: two-dimensional array of days for current month.
```

Day Class

```
package Calendar;
```

```
import java.util.*;
```

```
class Day {
    private ArrayList appointments;
    private int dayNumber;
    private String name;

    public Day(String theName, int theNumber) {
        name = theName;
        dayNumber = theNumber;
        appointments = new ArrayList();    }

    public void addAppointment(String description) {
        appointments.add(description); }

    public int getDayNumber() {
        return dayNumber; }

    public String getName() {
        return name;
    ... }
```

Day Class (continued)

```
class Day { ...

    // constructor, addAppointment, and accessors omitted.
    public boolean anyAppointments() {
        if (appointments.size() != 0) { return true; }
        else { return false; } }

    public String toString() {
        String result=name + "(" + dayNumber + ")\n";
        String[] allAppointments = new String[appointments.size()];
        appointments.toArray(allAppointments);
        for (int i=0; i<allAppointments.length; i++) {
            result += "    " + allAppointments[i] + "\n"; }
        return result; } }
```

MonthlyCalendar Class

```
public class MonthlyCalendar {
    // Some details omitted ...
    private int numberOfDays;
        private int startingDayNum;
        private String monthName;
        private Day[ ][ ] calendar;

    public MonthlyCalendar(String theMonthName, int theNumberOfDays,
                           int theStartingDay) {

        monthName = theMonthName;
        numberOfDays = theNumberOfDays;
        startingDayNum = theStartingDay;
        calendar = new Day[NUMBER_OF_WEEKS][ ];
        int currentDayNumber = 1;
        int dayIndex = 0;
        for (int week=0; week<NUMBER_OF_WEEKS; week++) {
            calendar[week] = new Day[DAYS_PER_WEEK];
            // Create the Day objects for the current week
            for (int dayOfWeek=0; dayOfWeek<DAYS_PER_WEEK; dayOfWeek++) {
                if (dayIndex >= (startingDayNum - 1)) {
                    calendar[week][dayOfWeek] =
                        new Day(mapIntToDayName(dayOfWeek), currentDayNumber);
                    currentDayNumber++; }
                dayIndex++;
            }
        } } ... } // More to come.
```

MonthlyCalendar Class (continued)

Three Support functions:

```
public String mapIntToDayName(int value) {
    String[] dayNames =
        {"Sunday", "Monday", "Tuesday", "Wednesday", "Thursday", "Friday", "Saturday"};
    return dayNames[value]; }

public void addAppointment(int theDayNumber, String description) {
    for (int weekNum=0; weekNum<calendar.length; weekNum++) {
        for (int dayNum=0; dayNum<calendar[weekNum].length; dayNum++) {
            Day day = calendar[weekNum][dayNum];
            if ((day != null) && (day.getDayNumber() == theDayNumber)) {
                day.addAppointment(description); } } } }

public String toString() {
    String result = monthName + "\n";
    for (int weekNum=0; weekNum<calendar.length; weekNum++) {
        result += "Week[" + (weekNum+1) + "]\n";
        for (int dayNum=0; dayNum<calendar[weekNum].length; dayNum++) {
            Day day = calendar[weekNum][dayNum];
            if ((day != null) && (day.anyAppointments())) {
                result += " " + calendar[weekNum][dayNum]; } } }
    return result;
}
```

Example Output

```
MonthlyCalendar monthlyCalendar = new MonthlyCalendar("May", 31, 6);
```

```
monthlyCalendar.addAppointment(2, "Clean Car");
monthlyCalendar.addAppointment(2, "Pay Mortgage");
monthlyCalendar.addAppointment(3, "Parent Meeting");
monthlyCalendar.addAppointment(28, "Submit project");
```

```
System.out.println(monthlyCalendar);
```